DOCUMENT RESUME

ED 091 570 CE 001 342

TITLE Managing Highway Maintenance: Standards for Maintenance Work, Part 3, Unit 8, Level 2.
INSTITUTION Federal Highway Administration (DOT), Washington, D.C. Offices of Research and Development.
PUB DATE Jan 73
NOTE 72p.; For related documents, see CE 001 339-341 and 343-346

EDRS PRICE MF-$0.75 HC-$3.15 PLUS POSTAGE
DESCRIPTORS Autoinstructional Aids; Civil Engineering; *Maintenance; *Management Development; Manuals; Performance Specifications; Programed Instruction; Programed Units; *Road Construction; *Standards; *Supervisory Training
IDENTIFIERS *Highway Maintenance

ABSTRACT

Part of the series "Managing Highway Maintenance," the unit explains various uses of maintenance standards and how standards should be interpreted and communicated to formen and crew leaders. Several examples are given of the decisions made when applying the standards to routine work. The preceding units on standards (parts 1 and 2) should be completed before reading this unit. The format is a programed, self-instructional approach in which information is presented in progressive segments or frames. (EA)

ED 091570

MANAGING HIGHWAY MAINTENANCE

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

STANDARDS FOR MAINTENANCE WORK

PART THREE

Management by Objectives Series

UNIT 8

LEVEL 2

CE001342

FEDERAL HIGHWAY ADMINISTRATION
Offices of Research and Development
January 1973

This book is part of the series "Managing Highway Maintenance," prepared for the Implementation Division, Office of Development, Federal Highway Administration, under contract FH-11-7600. The series as a whole is described in the *Training Guide and Catalog* volume.

The contents of this book reflect the views of the contractor, Roy Jorgensen Associates, Inc. The contents do not necessarily reflect the official views or policy of the Department of Transportation.

These materials do not constitute a standard, specification, or regulation.

Implementation Division
Offices of Research and
Development

Washington, D.C.
January 1973

PART THREE

USING, INTERPRETING AND COMMUNICATING STANDARDS

INTRODUCTION

This is Part Three of "Standards for Maintenance Work." It explains the various uses of maintenance standards, how standards should be interpreted and how they should be communicated to foremen and crew leaders. Included in this part are several examples of the decisions made when applying the standards to routine work. Before reading this part, check to make sure you have completed Parts One and Two of this unit.

TRAINING TECHNIQUE

The information in this unit is presented in small segments -- called frames. Most frames require you to answer a question about the information in the frame. The answer you pick will instruct you to go to a different part of the unit. To complete the training:

+ CAREFULLY READ EACH FRAME.
+ FOLLOW THE DIRECTIONS AT THE END OF EACH FRAME.

Turn the page and read Frame 1.

Section One

HOW TO USE MAINTENANCE STANDARDS

1

Now, you know the different kinds of standards -- including quality and performance standards. And you know that the important features of these standards usually are summarized in "maintenance standards." But how should you apply standards to the day-to-day things that have to be done? How should standards be used? Is there any room for interpreting standards? How should standards be communicated to your subordinates?

1 (continued)

This part of the training answers these and other questions.

Go to Frame 2.

2

Standards are goals to be reached. As goals, they represent an ideal -- the best combination of resources and the best way to get the job done -- under normal operating conditions. Standards are also guidelines. As guidelines they show the kinds and amounts of resources to be assigned to an operation, the work procedure and the expected results.

2 (continued)

Which level of management is most likely to use the recommended procedure as suggested in the maintenance standard?

A.	Foreman.	Go to Frame 3.
B.	Field engineer.	Go to Frame 4.
C.	Head office.	Go to Frame 5.

3

Right. Foremen are the ones who are directly in charge of work procedures, so they are the ones most likely to use this part of a standard.

Which management level is most likely to use the recommended crew size, equipment and material?

A.	Foreman.	Go to Frame 6.
B.	Supervisor.	Go to Frame 7.
C.	Head office.	Go to Frame 8.

4

No. The engineer is interested in work procedures as they relate to efficiency and cost, but he doesn't use work procedures in the sense of following them.

Go to Frame 2 and make another choice.

5

No. The head office may be interested in work procedures, but they don't use them.

Go to Frame 2 and try again.

6

Maybe. If foremen plan their own crew size and assign equipment to themselves, they would be likely to use the information on crew size, equipment and material, as recommended in maintenance standards. But foremen usually don't have this responsibility. Who does?

Go back to Frame 3 and choose again.

7

Right. Unless foremen assign their own resources (men, equipment and material), it's the supervisor's job. So, you -- the supervisor -- are most likely to use the information on resources.

Nearly every part of a maintenance standard is useful in planning and scheduling work.

7 (continued)

Here is the "Description and Purpose" section of a maintenance standard on Joint and Crack Filling:

DESCRIPTION AND PURPOSE: Cleaning and filling with liquid sealant asphalt surface cracks which are greater than $\frac{1}{4}$-inch wide.

How is this section most useful in scheduling work?

A. It can be used as a guide for when to schedule work. — Go to Frame 9.

B. It can be used for determining the materials needed. — Go to Frame 10.

C. It can be used to decide whether or not work is needed. — Go to Frame 11.

8

No. The head office is not likely to get too mixed up in field operations. There are plenty of management personnel in the field. They are more concerned with staffing field activities.

Go to Frame 3 and make another choice.

9

Maybe. It depends on what you mean by "when." If you mean "whether or not work should be scheduled," you're right. It can help.

But if you mean the time of the month or day of the week, you're wrong. The "Description and Purpose" section will not help make this decision.

Another answer in Frame 7 is better.

10

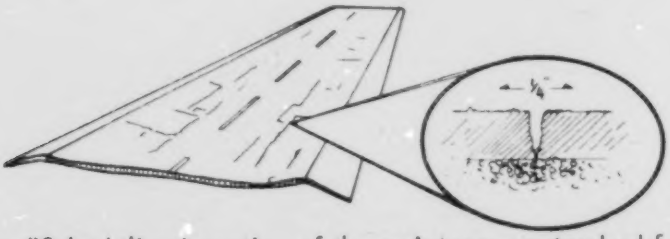
This section does mention material -- liquid sealant asphalt. But other material can also be used in joint and crack filling.

This is the wrong answer.

Go back to Frame 7.

11

Right. The "Description and Purpose" section of a maintenance standard indicates whether or not work is needed. In this case, cracks are to be filled only if they are more than $\frac{1}{4}$-inch wide.



Here's the "Scheduling" section of the maintenance standard for the same activity -- Joint and Crack Filling:

> **SCHEDULING:** Schedule this work when the temperature is not expected to be above 50°F.

How would you use this scheduling note?

A. In deciding how often the work should be done. Go to Frame 12.

B. In deciding work priorities. Go to Frame 13.

C. As a guide for when to schedule work. Go to Frame 14.

12

You would use the scheduling section to decide how often work should be done? Good luck! There is no mention here about how many times a week, month or year this work has to be done.

Go back to Frame 11.

13

If you picked this answer you are just guessing.

Read the scheduling note again and choose another answer -- Frame 11.

14

You would use the scheduling note as a guide for when to schedule work. Right. This is exactly what it should be used for.

14 (continued)

How is the "Type of Activity" section most useful?

TYPE OF ACTIVITY: Routine Maintenance

A.	It's "nice to know" information.	Go to Frame 15.
B.	It shows the priority of the operation.	Go to Frame 16.
C.	It is not useful in scheduling work.	Go to Frame 17.

15

It may be "nice to know" information, but it also serves a basic scheduling purpose.

A better answer is in Frame 14.

16

This is it. The "Type of Activity" section usually shows the priority of an operation. This is the way the head office wants you to look at an activity. If it's emergency work, it should be done as soon as possible. If it's routine, it should be scheduled when convenient. And if it's special work, it should be done according to plans from the head office -- if emergency and routine work don't interrupt it.

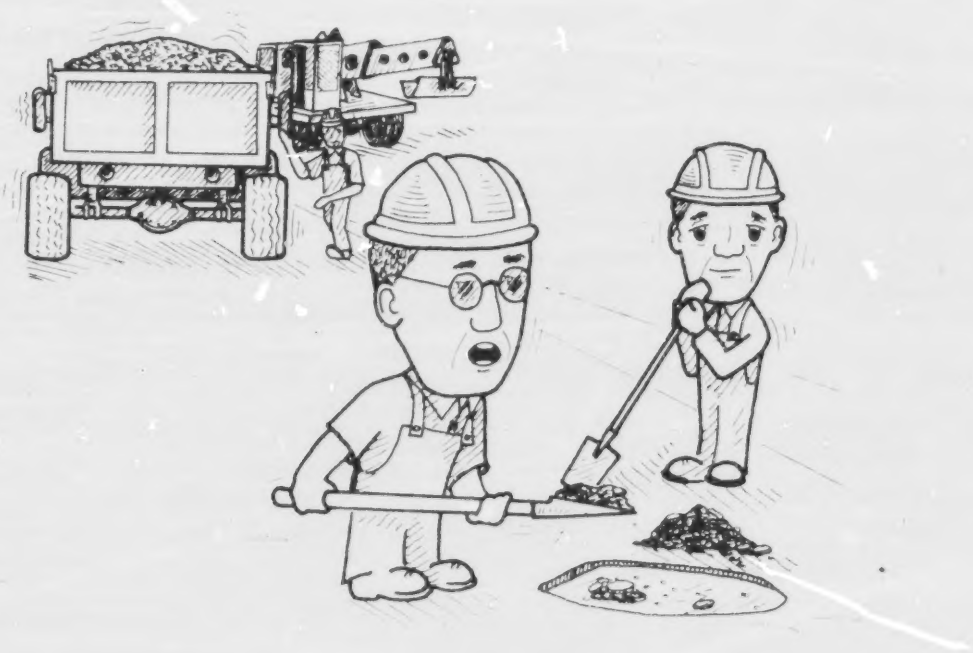
Go to Frame 18.

17

It's not useful in scheduling work? Wrong. The information in this section may not be useful to foremen, but it should be to you and other supervisors who schedule work.

Go back to Frame 14.

18



The "Crew/Equipment" and "Material" sections of a maintenance standard represent the best combination of resources -- under typical conditions. So it's obvious that they are used as guidelines for deciding what resources should be scheduled.

18 (continued)

CREW/EQUIPMENT	ACCOMPLISHMENT
Recommended Crew Size: 7 (Add flagmen as needed) **Equipment:** 2 Trucks 03 1 Truck 02 1 Asphalt Kettle (600 or 300 as avail.) 36 1 Compressor 19 (Flashing arrow truck or trailer mounted may be added as needed for traffic control.)	**Work Unit:** Gallon of sealant **Daily Production:** 100-200 gallons **Average Productivity:** 0.4 man-hours/gallon **MATERIAL** Sealant Sand or 31C (3/8" stone maximum)

What about the "Accomplishment" section? How is it most useful in scheduling work?

A. It helps estimate the number of days needed to perform the work you want to schedule. Go to Frame 19.

B. It describes the work unit. Go to Frame 20.

C. It estimates daily production. Go to Frame 21.

Right. If you know the expected daily production, you can determine how many days are needed to perform the work to be scheduled.

LET'S SEE..... THE STANDARD SAYS THAT THE DAILY PRODUCTION SHOULD BE 6 TONS PER DAY.. AND I'D SAY THAT 30 TONS ARE NEEDED..... SO THAT'S ABOUT 5 DAY'S WORK!!!

Suppose joint and crack filling must be scheduled. You think that about 450 gallons of sealant are needed for the road segment you have in mind. The standard contains the following information:

CREW/EQUIPMENT	ACCOMPLISHMENT
Recommended Crew Size: 7 (Add flagmen as needed)	**Work Unit:** Gallon of sealant
Equipment:	**Daily Production:** 100-200 gallons
No. / Description / Group: 2 Trucks 03; 1 Truck 02; 1 Asphalt Kettle (600 or 300 as avail.) 36; 1 Compressor 19	**Average Productivity:** 0.4 man-hours/gallon
(Flashing arrow truck or trailer mounted may be added as needed for traffic control.)	**MATERIAL**
	Sealant Sand or 31C (3/8" stone maximum)

19 (continued)

What could you estimate from this?

A. It is a good-sized job. It should take about three days and 168 man-hours. Go to Frame 22.

B. The job needs five pieces of equipment for three days. It should take about 168 man-hours and should cost around $1,250. Go to Frame 23.

C. The job will take four days, seven men and five pieces of equipment. Go to Frame 24.

20

True. It does describe the work unit. But how does that help you schedule work?

Choose again -- Frame 18.

21

Yes, it does. And by estimating the daily production, it helps you determine the number of days needed to perform the work you want to schedule.

Go to Frame 19.

22

Right. If we split the difference between 100-200 gallons for daily production, we have an average of 150 gallons per day. It would take three days to pour 450 gallons of sealant. And seven men putting in three eight-hour days amounts to about 168 man-hours.

Here is the last section of the maintenance standard on Joint and Crack Filling:

RECOMMENDED PROCEDURE:

1. Before filling, clean cracks with air compressor.
2. Apply sealant heated to the specified application temperature.
3. Fill cracks to within $\frac{1}{4}$-inch of the top of the surface to allow for expansion.
4. Sprinkle sand or 3/8" stone on top.

Criterion - only cracks greater than $\frac{1}{4}$-inch (pencil diameter) will be filled.

How can this section be helpful?

A. It can be used to estimate the number of men it will take to perform each task. Go to Frame 25.

B. It's not much help in scheduling work, but it's useful as a work control tool. Go to Frame 26.

C. It can be used as a work guide. "These are the steps to take to do the job." Go to Frame 27.

22

Right. If we split the difference between 100-200 gallons for daily production, we have an average of 150 gallons per day. It would take three days to pour 450 gallons of sealant. And seven men putting in three eight-hour days amounts to about 168 man-hours.

Here is the last section of the maintenance standard on Joint and Crack Filling:

RECOMMENDED PROCEDURE:

1. Before filling, clean cracks with air compressor.
2. Apply sealant heated to the specified application temperature.
3. Fill cracks to within $\frac{1}{4}$-inch of the top of the surface to allow for expansion.
4. Sprinkle sand or 3/8' stone on top.

Criterion - only cracks greater than $\frac{1}{4}$-inch (pencil diameter) will be filled.

How can this section be helpful?

A. It can be used to estimate the number of men it will take to perform each task. Go to Frame 25.

B. It's not much help in scheduling work, but it's useful as a work control tool. Go to Frame 26.

C. It can be used as a work guide. "These are the steps to take to do the job." Go to Frame 27.

23

Okay except for the cost estimate. The part of the standard shown has no cost information, so cost cannot be estimated from just this information.

Go to Frame 19 and try again.

24

No. The number of days is wrong. If the daily production is between 100-200 gallons, it should take only three days (not four) to pour 450 gallons of sealant.

Check your figures again and make another choice from Frame 19.

25

Oh, come on now! Why try to estimate crew size from the "Recommended Procedure" section? Another section describes the crew size.

Go back to Frame 22.

26

Right. The "Recommended Procedure" section is not much help in scheduling work. But it is useful as a work control tool. This section is particularly useful when spot checking crews.

26 (continued)

Other sections of a maintenance standard also help control work. Crew performance should be compared with figures on the standard. These comparisons answer such questions as:

> How does the actual productivity of a job compare with the standard productivity?
>
> Is the actual production acceptable?
>
> Are appropriate crew sizes and equipment being used?

Answers to these and other questions are part of work control. And standards provide the bases for comparison in the work control process.

Another part of the work control process provides a starting point for taking action. Here standards help point out the difference between what did happen and what should have happened.

26 (continued)

So, as far as work control is concerned, standards serve as "yardsticks" for measuring performance.

Go to Frame 28.

27

True. The "Recommended Procedure" section is used as a work guide. But usually, it's foremen and crew leaders who use it this way. Most supervisors who plan and schedule work use this section in another way.

The correct answer is in Frame 26.

28

This section has shown how maintenance standards can be useful.

You can use maintenance standards:

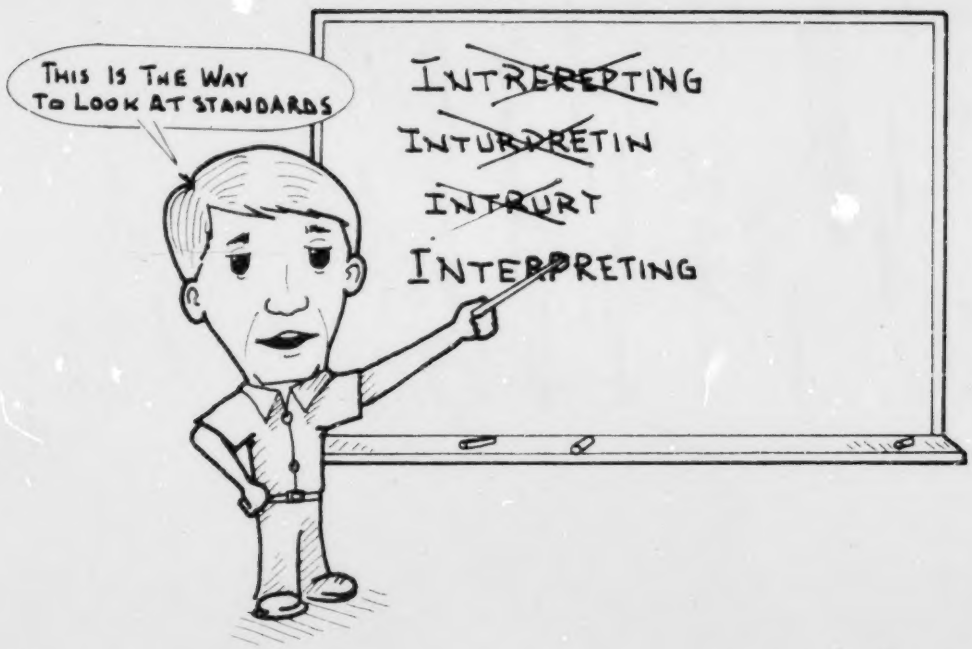
+ As planning and scheduling aids;

+ As guides for spot checking crews in the field, and as

+ As bases for work control.

The fact that standards should be used is important. But even more important are the decisions made when applying the standards.

Go to Frame 29.



Section Two

INTERPRETING STANDARDS

Do maintenance standards have to be used all of the time? Are there exceptions? The answer is "yes" to both questions -- with certain qualifications.

Look at the following quality standard -- for Mowing:

> When the vegetation is 14 inches high,
> cut it down to a height of five inches.

29 (continued)

Suppose you had two extra men and mowers available at a time when grass and weeds were only ten inches high. Should the grass be cut?

A. Probably yes. Go to Frame 30.

B. Probably not. Go to Frame 31.

30

The grass probably should be cut? No. If quality standards aren't followed there can be no uniform levels of maintenance -- throughout the Department. Ignoring quality standards can also blow the budget.

Go to Frame 31.

31

This is the right answer. Quality standards must be followed:

+ To provide a uniform level of maintenance and

+ To keep within the budget.

So, quality standards should be followed, period. But what about performance standards?

Suppose you are scheduling a ditch cleaning job and you have all the men and equipment shown on the following maintenance standard:

31 (continued)

MAINTENANCE STANDARD

CLEAN AND RESHAPE DITCHES

April 17, 1972 Activity No. 124

DESCRIPTION AND PURPOSE:

Cleaning and reshaping roadway ditches to restore the original flow line and grade; to include loading, hauling and disposal of ditch sediment.

SCHEDULING:

Check scheduling calendar.

TYPE OF ACTIVITY:

Special Authority

CREW/EQUIPMENT

Recommended Crew Size: 6

(Add flagmen as needed.)

Equipment:

No.	Description	Group
3	Trucks	04
1	Front-end loader	38
1	Motor grader	31

ACCOMPLISHMENT

Work Unit: Ditch mile

Daily Production: 0.2-0.4 miles

Average Productivity: 160 man-hours/ditch mile

MATERIAL

None

RECOMMENDED PROCEDURE:

1. Provide adequate outlet for water, establish flowline of ditch, and provide dumping spot for dirt removed.
2. Remove excess dirt with grader and windrow on shoulder for pickup by loader. Keep interference with traffic at a minimum.
3. Do not cut V-bottom ditches. Six-foot, flat-bottom ditches are minimum requirements.
4. Dress, mulch and seed slopes as needed for erosion control.

31 (continued)

How many men and what equipment should be scheduled?

A. Six men, three trucks, a front-end loader, and a motor grader. Go to Frame 32.

B. Eight men, two pickups and one dump truck, and a Gradall can be used. Go to Frame 33.

C. It all depends on the size of the job. Go to Frame 34.

32

Yes. In this case, the standard should be followed -- six men, three trucks, a front-end loader and a motor grader. The standard combination of men and equipment are assigned to the work. And the job is done -- and the results are about what you would expect: production and productivity are acceptable.

But if something can go wrong, it will.

Suppose that on a base repair job, the Gradall you have been using breaks down. The standard for this work calls for seven men, three dump trucks, a Gradall, and a rubber tire roller.

There is more base repair work to be done. What should you do?

A. Something besides repairing base. Go to Frame 35.

B. Use a backhoe and an air compressor and hammer. Go to Frame 36.

C. Try to follow the standard. Go to Frame 37.

33

Why change the combination of resources set out by the standard? Unless conditions are highly unusual, no change in manpower or equipment is needed.

In this case, the standard should be followed.

Go to Frame 32.

34

It depends on the size of the job? Not really. In this case, the same crew size and equipment probably should be used to clean two miles -- or 12 miles -- of ditch.

Most of the time, performance standards should be followed.

Go to Frame 32.

35

Perhaps, but let's assume that you have to patch the base. You can't give up and do something else.

Go back to Frame 32 and choose again.

36

Yes, this is probably what you have to do. You can't get another Gradall and you can't give up on base patching. So, you have to substitute other equipment for the Gradall. A backhoe, a compressor and jackhammers are a good, but slow substitute.

Standards should be followed. But in this case, the standard couldn't be followed.

What conclusions can be drawn about interpreting standards?

A. Standards are rules which must be followed. If the standard crew size is three, the actual crew size must be three. Go to Frame 38.

B. Standards are guidelines which should be followed if possible. If the standard crew size is three, the actual crew size should be three. Go to Frame 39.

C. Standards are suggestions which should be considered. If the standard crew size is three, the actual crew size probably should be between two and four. Go to Frame 40.

37

No. How can you follow strictly a standard which calls for a Gradall when a Gradall is unavailable? You can't.

Go to Frame 32 and try again.

38

This is too strict. Suppose the conditions are more unfavorable than normal. The haul distance is extra long, traffic is very heavy, the grade is steeper than usual, the ground is harder than normal -- or any similar condition. In such a case the standard probably can't be followed exactly.

Go to Frame 36 and try again.

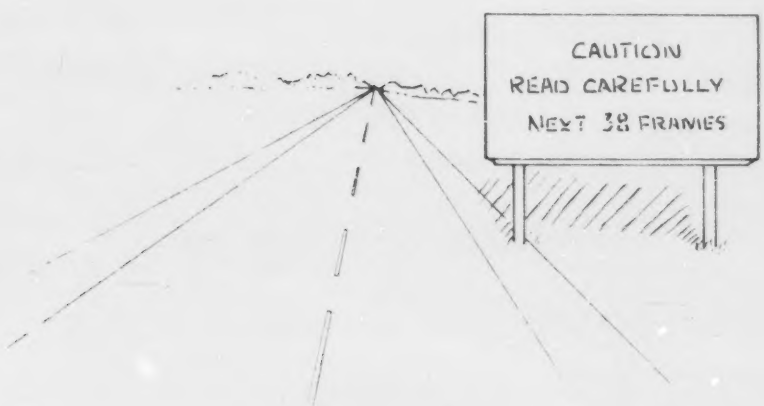
39

Right. Standards are guidelines which should be followed:

+ If the standard crew size is three, then three men should be assigned to do the work.

+ If two men and one dump truck represent the standard for picking up litter, then this is what should be used -- even if a third man is available.

+ If the standard calls for a rapid cure asphalt on a given activity, then an MC or an SC should not be used.



39 (continued)

But, as we've seen, there are times when standards cannot be followed. An open base cut needs to be filled, potholes must be patched and emergency work must be done -- even if it means "bending" the standards. And the reason for bending in these instances is obvious: the work must be done because it presents an immediate danger to the traveling public.

There is at least one other reason for bending maintenance standards. Which of the following is the best reason?

A. When a certain job can be done faster by using more men and equipment. Go to Frame 41.

B. When there are men available and no other work needs to be done. Go to Frame 42.

C. When an activity can be done in a more efficient manner. Go to Frame 43.

D. (All of these are good reasons for bending standards.) Go to Frame 44.

40

This interpretation is too loose. The Department spends a lot of money, time and talent on the development of standards. It expects those standards to be used as more than mere suggestions.

There's a better conclusion in Frame 36.

41

The standards should not be followed when a job can be done faster by using more men and equipment.

Probably not.

Most maintenance activities can be done best by a given number of men and a certain amount of equipment. Using a lot more men and equipment usually will not make the work go faster. In fact, too many men may even decrease production.

Here is a summary of some actual data. The job is premix leveling -- spot dumping premix over rough sections of road, leveling the premix with a motor grader and rolling it with a rubber tire roller. The number of men and the actual production are shown below:

Date	Crew Size	Average Daily Production
Fourth week in May	5	39 tons
Third week in June	6	46 tons
Fourth week in June	7	58 tons
Second week in July	8	60 tons
Third week in August	9	64 tons
First week in August	10	66 tons
Second week in August	12	61 tons

Based on this information, how many men should be assigned to this activity?

A.	Seven.	Go to Frame 45.
B.	Eight.	Go to Frame 46.
C.	Nine.	Go to Frame 47.
D.	Ten.	Go to Frame 48.

42

This is not the best reason. In fact, it's pretty bad. What you are really saying is that you are willing to waste money by doing work less efficiently than it should be done.

If five men represent the best crew size for an activity, you would send seven -- just because you have not found productive work for two men. Besides that, how do you suppose the two extra men feel about being assigned to a job on which they are not needed?

And whatever you do, don't tell anyone that you have too many men. You do have too many, but no one will give you a pat on the back for wasting money and demoralizing employees.

But in the meantime, go back to Frame 39 and pick another reason.

43

Yes. Of the reasons given, this is the only one that is very good. Standards can be bent when you have reason to believe that an activity or a certain job can be done more efficiently -- by assigning five or six men instead of four, and by adding another truck to the operation. Standards can be bent when you think that a three-man crew will be more efficient than the standard five-man crew.

Let's look at a typical week's work and observe some activities and bend a few standards -- and see what happens.

Suppose you are the supervisor in Ryan County. A listing of your manpower and equipment and other data -- including maintenance standards -- are in a booklet titled "Management Data and Maintenance Standards." Use this booklet to complete the rest of this section.

43 (continued)

BEFORE GOING ON, TAKE A FEW MINUTES TO BECOME FAMILIAR WITH THE STANDARDS IN "MANAGEMENT DATA AND MAINTENANCE STANDARDS."

Then go to Frame 51.

44

You guessed! Sometimes guessing is the only way to solve a problem. Sometimes, a trial and error method is the only way to get where you want to go.

Do you really believe that "all of these are good reasons?"

A.	Yes.	Go to Frame 41.
B.	No, I guessed.	Go to Frame 43.

45

Seven men should be assigned to premix leveling. Probably so, but it depends on which is more important -- speed or efficiency.

If speed is more important, then you're better off with two five-man crews. The two crews should be able to place about 78 tons per day, which is 12 tons more than the daily production of a ten-man crew and 15 tons more than what you would expect of a 12-man crew -- according to the data in Frame 41.

If efficiency is more important, then a seven-man crew probably is best -- in terms of the number of tons placed per man:

Crew Size	Tons per Man
5	7.8
6	7.7
7	8.3
8	7.5
9	7.1
10	6.6
12	5.1

But the thing to remember is that larger crews do not necessarily mean that work will be done faster -- or more efficiently.

Now go back to Frame 39. Read it again, and pick another reason for bending a standard.

46

Eight men should be doing premix leveling? No. If seven men can accomplish 58 tons per day, why add one man? He will contribute only two more tons per day.

You have increased the crew size by about 14 percent, but you have only increased production by three percent. You're getting the job done faster? Not really.

Try another crew size -- in Frame 41.

47

The crew size should be nine men? Wrong.

Pick a different crew size -- in Frame 41.

48

The best crew size is ten men. If production -- or speed -- is critical, then ten men should be assigned to premix leveling. Apparently, no other crew size places more premix per day.

But did you notice that two five-man crews probably could get the work done faster? One five-man crew is averaging 39 tons per day. Two probably could place 78 tons per day -- 12 more than your ten-man crew.

48 (continued)

What conclusion can be drawn?

A. Larger crew sizes sometimes can get work done faster than smaller crews. Go to Frame 49.

B. Larger crew sizes don't necessarily mean that work will be done faster. Go to Frame 50.

49

Yes. Sometimes the bigger crew gets more done than the smaller crew. And the word "sometimes" is important.

Now go back to Frame 39. Read it again, and pick another reason.

50

Yes. Sometimes speed is critical. When it is, don't jump to the conclusion that a bigger crew will get the work done faster. Also think in terms of what you'll be getting by using a bigger or smaller crew. Think in terms of percentages: a 20 percent increase in crew size had better result in a 20 percent increase in production. If it doesn't, you're not getting your money's worth -- unless speed is critical.

Yes. Larger crew sizes don't necessarily mean that work will be done faster.

Now go back to Frame 39. Read it again, and pick a better reason for bending the standards.

MONDAY

It is Monday morning and you have assigned work to all of your foremen and crew leaders. Here is a list of some of the work being done:

Foreman or Crew Leader	
F. Comstock	Spot Sealing -- west of Hampton on Route 4. (A map is on page 2 of your booklet.)
J. Box	Premix Patching -- on Route 160 from Harrell to the County Line.
P. Framm	Cleaning and Reshaping Ditches -- south of Thornton.
J. Bandera	Spot Patching Shoulders -- on Route 9 from I-20 to the County Line.

Shortly after the men leave the garage, you get a complaint about a pile of litter on Route 202, just west of Thornton. So you decide to check the complaint and also see how Pete Framm is getting along.

What combination of men and equipment do you expect to see on Pete's ditching job?

A.	The number of men and the equipment assigned earlier this morning.	Go to Frame 52.
B.	Eight men, two dump trucks and a Gradall.	Go to Frame 53.
C.	Six men (plus one flagman), three trucks, one front-end loader and a motor grader.	Go to Frame 54.

52

Yes. This makes sense. But remember, you are using the standards in the booklet, "Management Data and Maintenance Standards."

Turn to the maintenance standard for "Clean and Reshape Ditches."

Then go back to Frame 51 and answer the question again.

53

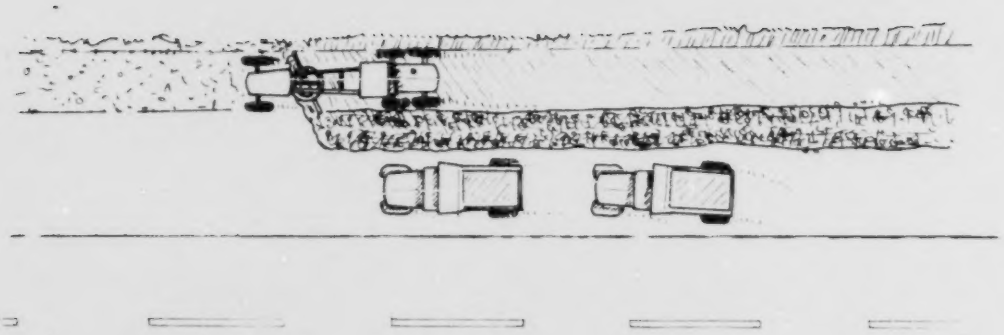
No. Remember, you're using the maintenance standards. And the standard for "Clean and Reshape Ditches" is not eight men, two dump trucks and a Gradall.

Maybe you're looking at the wrong standard. Find the right one -- then go back to Frame 51 and pick the standard combination of men and equipment.

54

Yes. You decided that one flagman would be needed in addition to the six-man crew. And you expect to see three trucks, one front-end loader and a motor grader on the job.

Everyone is at the job site -- just as you had expected.

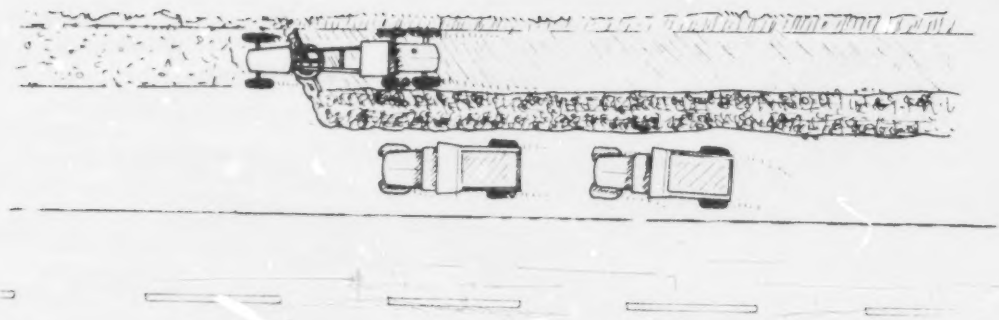


The work started about 9 A.M. and you arrive at 9:30. The motor grader has completed placing one windrow on the shoulder and the front-end loader is loading the first truck. The materials are being hauled to a dump site about three miles up the road.

Pete says that everything is going okay, so you check the litter -- and decide that it needs to be picked up and the sooner the better. You make a note of it, get some lunch, and on your way back to the garage, check the ditch work again.

After watching the work for a half-hour or so, you notice that one dump truck is always ready to be loaded. And a couple of times there have been two trucks at the job site, but for only a few minutes. As a rough estimate, you figure that it's taking about twenty minutes for a truck to be loaded, travel to the dumping site and return to the job site.

54 (continued)



The work started about 9 A.M. and you arrive at 9:30. The motor grader has completed placing one windrow on the shoulder and the front-end loader is loading the first truck. The materials are being hauled to a dump site about three miles up the road.

Pete says that everything is going okay, so you check the litter -- and decide that it needs to be picked up and the sooner the better. You make a note of it, get some lunch, and on your way back to the garage, check the ditch work again.

After watching the work for a half-hour or so, you notice that one dump truck is always ready to be loaded. And a couple of times there have been two trucks at the job site, but for only a few minutes. As a rough estimate, you figure that it's taking about twenty minutes for a truck to be loaded, travel to the dumping site and return to the job site.

54 (continued)

Pete says that everything is going okay. Do you agree?

A.	Yes. The men look busy and the work is being done according to the standard.	Go to Frame 55.
B.	Yes, but it would be nice if a Gradall were being used.	Go to Frame 56.
C.	No. Two, instead of three trucks probably should be used.	Go to Frame 57.
D.	No. Another motor grader should be added to the equipment being used.	Go to Frame 58.

55

You agree with Pete? Why? Because the men look busy? Look again. One dump truck is <u>always</u> ready -- and waiting -- to be loaded. And sometimes there are two.

The men may look busy, but they are not -- at least the truck drivers are not too busy. True, the standards are being followed, but maybe this is one instance in which they should be bent a little.

Pick another answer in Frame 54 -- and this time disagree with Pete.

56

Nope! This is a flat-bottom ditch -- 120 feet wide. And the ground is firm enough to support several motor graders.

Go back to Frame 54.

57

Everything is not okay. Right. Two, instead of three trucks should be used. Also right.

You realize that each truck is idle -- for about ten minutes after it has returned to the job site -- so you do a little scratch paper work, and come to the conclusion that about seven man-hours per day are being wasted:

EACH TRUCK MAKES TWO ROUND TRIPS PER HOUR ... 40 MINUTES WORKING, 20 MINUTES IDLE

SO EACH TRUCK IS IDLE ABOUT 7 X 20 ... 140 MINUTES DURING THE DAY, (2 HOURS 20 MINUTES)

AND THE TOTAL IDLE TIME FOR ALL THREE TRUCKS IS 7 HOURS, (2:20 X 3)

57 (continued)

So you decide to try five men, two dump trucks and the loader and grader, but Pete says that he will accomplish 1,600 feet of ditching today -- and he doesn't think he will get as much done if only two trucks are used tomorrow.

How many feet of ditching do you expect to be done tomorrow -- without the third truck?

A.	Less than 1,600 feet. Maybe 1,300 or 1,400 feet.	Go to Frame 59.
B.	About 1,600 feet.	Go to Frame 60.
C.	It all depends on several things, but maybe 1,600 feet -- if the crew is lucky.	Go to Frame 61.

58

You would not agree with your foreman? Right. The operation is not very well balanced if one -- and sometimes two trucks -- are waiting to be loaded.

But this is not the right answer. Adding another motor grader probably would not balance the operation. It seems like two trucks can handle everything the grader and loader can move. So if another grader is added, chances are good that four, instead of three trucks probably couldn't keep up with two graders.

Go to Frame 57.

59

Some supervisors would expect this. Some think that there is a very tight relationship between the number of trucks on a job and the amount of material hauled -- four trucks will move twice as much material as two and six trucks will accomplish three times as much. But this is true only if a loader can keep the trucks loaded all of the time -- with no truck having to wait to be loaded. This is true only if the capacity of the loader matches the capacity of the trucks.

Pete apparently does not see that the capacities of the equipment he is using do not match. But you do.

Go to Frame 57 and try again.

60

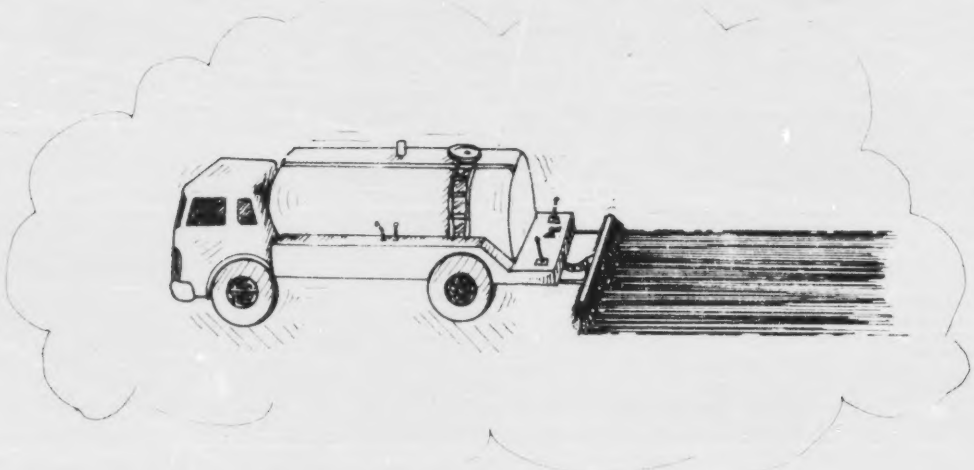
The same amount of work will be done even though only two trucks are used. Yes, simply because the three trucks are not working to capacity, the activity is not balanced.

So you bend the standard -- and you hope to do the same amount of work tomorrow.

60 (continued)

TUESDAY

Pete Framm is grumbling about getting only two trucks today, and Frank Comstock (who is doing the Spot Sealing) says that he "could sure use" another man and truck. Yesterday he had three trucks and he accomplished about 1.7 lane-miles of sealing.



What should you do?

A.	Ask Frank why he didn't get more done.	Go to Frame 62.
B.	Send one of the trucks that Pete was using with Frank's crew.	Go to Frame 63.
C.	The standard shows three trucks, so three should be used.	Go to Frame 64.

61

Yes, production is dependent on a number of factors. Maybe the crew will get 1,600 feet -- if they are lucky? No. Remember, you just figured that the total idle time for the trucks amounted to seven hours per day -- about one truck per day.

The third truck is not contributing very much to production -- is it?

Go back to Frame 57.

62

Frank was using the standard combination of men and equipment -- three trucks, an asphalt kettle, one roller and a chip spreader. But he accomplished something less than what you would expect on a typical day -- two to three lane-miles. So you might ask him what happened. You do, and he says that a rain shower about two o'clock put a stop to the work -- for about 45 minutes. There is no reason to bend the standard for Spot Sealing.

Now what do you do?

A. Find work for one of the drivers that was with Pete yesterday. Go to Frame 65.

B. Send one truck and driver to pick up the litter you saw yesterday. Go to Frame 66.

63

Why? Maybe Frank is right. Maybe he does need another truck and driver. But check the standard for this activity. Then find out how much Frank accomplished yesterday -- in Frame 60. Then pick another answer.

64

Maybe. Three trucks are included in the standard for this kind of work. But compare the daily production estimate in the standard with the amount of work Frank did yesterday.

Maybe something is wrong.

Check the standard for Spot Sealing. Then go back to Frame 60.

65

This is obvious. Some kind of productive work must be found for the driver, and maybe his truck. It might be the litter on Route 202 or aggregate that should be back-stacked or sign posts that need painting. Whatever work needs to be done by one man can be done today. Most supervisors have, or develop, a backlog of low priority work, just for times such as these -- for times when manpower and equipment are available.

But the important thing at this point is that you have bent one standard (Clean and Reshape Ditches) because you thought you could beat it -- the production will stay about the same, but productivity will be better: probably about 135 instead of 160 man-hours per mile of ditch. But you did not bend the standard for Spot Sealing because there was a good reason for low production and because you felt that one more man and a dump truck wouldn't be worth it. And you send the "extra" man to pick up the litter.

WEDNESDAY

On Wednesday morning the following work is being done:

Frank Comstock:	Spot Sealing -- Route 4
John Box:	Premix Patching -- Route 274
Pete Framm:	Cleaning and Reshaping Ditches -- Route 9W
Jim Bandera:	Spot Patching Shoulders -- Route 9
Bill Wilson:	Picking-up Litter -- Route 202
Jim Berry and Hank Jones:	Replacing Signs -- Hampton

Shortly after lunch you get a call from the state police. They say that an approach slab on I-20 has buckled. Traffic can get by on the shoulder, but something should be done before dark. So you decide to begin replacing the slab this afternoon.

What crew should be sent to begin the work?

A.	The crew working the ditches on Route 9W.	Go to Frame 67.
B.	Frank Comstock's.	Go to Frame 68.
C.	It will take two crews -- John Box's and Jim Bandera's.	Go to Frame 69.

66

Yes. This is one possibility. You have the truck and driver that was with Pete. And maybe the best thing for him to do is pick up the litter on Route 202.

Go to Frame 65.

67

Maybe. But how did you make this decision? If you look at the map on page 2 of the booklet, you can see that it will take the front-end loader a couple of hours to get to the interchange of Route 9 and I-20. Besides that, what other equipment is mentioned in the standards for replacing concrete surfacing?

Review the map and standards -- and make another decision.

68

Probably so. Frank's sealing crew probably is closer than any other crew. And the sealing crew has all of the manpower and half of the equipment recommended in the standard for this kind of work. Frank can send one truck and two men to pick up the air compressor, compactor and the backhoe, (all of which are available -- in the resource listing on page 3 of your booklet).

For this afternoon at least, a backhoe, instead of a front-end loader will be used to remove the concrete.

What other adjustments are needed?

A. The crew sizes for the two activities don't match. More men will be needed for the concrete work. Go to Frame 70.

B. Work might have to be found for two men -- for the rest of the afternoon. Go to Frame 71.

69

No. Check the road map and the maintenance standards, determine what each crew is doing and where they are doing it and what equipment they have.

Then go back to Frame 65 and make a better decision.

70

The crew sizes for the two activities don't match. Right. More men will be needed. Probably not. Check the standards.

Then go to Frame 71.

71

Probably so. The standard crew size for Spot Sealing is eight and the standard for Remove/Replace Concrete Pavement is six. So unless something extraordinary is involved, six men should be assigned to this work -- and some other work will have to be found for two men.

The concrete replacement work is a good example of a change in work priorities -- something you have to contend with almost every day. The priorities probably don't involve emergency work, but the basic idea is the same: the standards should be followed unless you have good reasons for bending them. In this case, the standards are followed, even though the work is classified as emergency maintenance.

71 (continued)

THURSDAY

The concrete work started yesterday will continue all day today. The other activities, started on Monday, also should be done today, except for the Spot Sealing. The only real decision to be made concerns the Premix Patching being done. For three days John Box and a helper have been patching potholes and edge failures -- small, scattered work. But today, John claims that he needs at least one more man and he would like to have a farm tractor and the pull grader -- to level a depression just east of town. He says that he will need about 20 tons of premix.

What do you do now?

A. Tell John to forget the depression. It will be scheduled next week. — Go to Frame 72.

B. This decision should have been made last week, but today you decide to do the work as John suggests. — Go to Frame 73.

72

This is a good possibility. If there are other potholes and edge failures to be patched and if the depression is not a traffic hazard, then there is no reason to interrupt the schedule. The work can be done next week. A wise decision.

But to make a point concerning standards, suppose you decide to do the work today.

Go to Frame 73.

Do the work as John suggests. After all, he has been with the Department for several years and he knows what is going on.

But wait a minute. Before jumping to a costly decision, take a look at the standards for this kind of work -- either Activity 103 or 159.

The standards don't help very much? True. Nowhere in the booklet are there recommendations -- or standards -- that match exactly this kind of leveling to be done.

Do the work as John suggests? Maybe. There are a number of options available and a number of decisions to be made -- if you want to do the work in an efficient manner:

+ Is one more man, a farm tractor and a pull grader sufficient?

- Twenty tons of material are needed. Can one dump truck handle it? How long will it take to make a round trip from the work site to the hot mix plant? If it takes longer to make the trip than it does to spread the premix, then the operation will not be balanced.

- Twenty tons of material will be placed. John didn't mention needing a roller. Shouldn't he have one? Can hand tamps or truck wheels be used? Tamps? Maybe, but it's not practical. Truck wheels? This is out of the question. The truck will be busy getting *premix*.

\+ There is no specific standard for this activity.

- Can the work be done in one day? Should it take only four hours? What do <u>you</u> expect in terms of production and productivity? What standards are you setting? You had better set something as an objective or goal.
- From what John has said, it is reasonable to expect that he does not plan to tack the surface before dumping the premix. Is this a good idea? Shouldn't provisions be made for an asphalt kettle or a drum of asphalt?

\+ How will doing this work affect the schedule?

- What adjustments will have to be made? What work are you going to stop in order to get the leveling done? The farm tractor and the pull grader have been sitting in the yard this week. But what about the roller? Isn't it being used on the concrete job? And where are you going to get another dump truck -- if one <u>is</u> needed?

73 (continued)

And there are more decisions to be made.

Which of the following statements is true?

A.	The leveling job is not typical. Too many decisions were listed.	Go to Frame 74.
B.	The process of setting standards must involve a number of decisions, but there is no need to make similar decisions when doing nonstandard work.	Go to Frame 75.
C.	There are a number of options available and each must be looked at in terms of what's to be expected if a given option is selected.	Go to Frame 76.
D.	The leveling work will have to be played by ear, and adjustments might have to be made as the job progresses.	Go to Frame 77.

74

You can't be serious. Think about the decisions you have to make every day.

The leveling work may not be typical, but the number of decisions to be made is entirely realistic.

If these kinds of decisions are not being made, then chances are good that work is not being done efficiently -- and someone is not doing his job.

Are you really serious, or are you reading this just to see what was said about a wrong answer?

74 (continued)

Yes. This is the wrong answer.

Go back to Frame 73. This time pick the answer that sounds best.

75

True. The process of setting standards involves a number of decisions. There is no need to make similar decisions? It depends on whether or not you want maintenance performed in an efficient, economical manner.

Assume that you do, and pick a better statement from Frame 73.

76

True. The leveling job is not standardized -- and a number of options are available. This answer sounds correct, and it is, but in many cases, even standardized activities present the same kinds of options.

Alternate courses of action are nearly always available. And frequently there are too many possibilities -- too many chances that work will not be done efficiently. Here is another way of putting it:

> Maintenance standards are not a substitute for sound management thinking and most of the thinking must center on what you expect will happen as a result of bending a standard.

76 (continued)

FRIDAY

It began raining about 6 A.M.; it's raining when you get to the garage and the forecast calls for rain all day. Some days are like this. You know it will rain once in a while, so you have made decisions ahead of time about what work, if any, will be done. And the standards have helped make several decisions. And you know what it means to "interpret maintenance standards."

+ Standards are guidelines which should be followed, but there are times when a performance standard cannot be followed -- and the standard has to be bent a little.

+ When bending a standard, the most critical decision is: what will happen -- in terms of production, productivity and the quality of the work done?

+ Performance standards can be bent, but you should expect the results of your bending to be better than the results you would expect by using the standard. If there is reason to think that results will not surpass standard accomplishment, then follow the standard.

+ There are many conditions and options which influence the results of work -- and all of these have to be taken into account when interpreting maintenance standards.

It's Friday night, and another typical week is over.

Go to Frame 78.

77

Adjustments might have to be made as this job progresses. True. You made a typical adjustment in the ditching operation a few frames back.

The leveling work will have to be played by ear? No. For years and years maintenance supervisors have been playing things by ear. But within the last few years, many of them have realized that it doesn't have to be done this way. Many know that most work can be planned and scheduled in an orderly, efficient manner and that standards can be developed, and for those activities which are not standardized, a lot of careful thinking must be done to ensure that the work will be accomplished -- not by ear, but by thinking about the options that are available and what each option will contribute to results.

Go back and pick another statement -- in Frame 73.

Section Three

COMMUNICATING STANDARDS

Maintenance standards are useful management tools for all levels of field management. And by now you know how to use and interpret standards for scheduling and work control purposes. Foremen and crew leaders must also know how to use standards. And it's your job to communicate how these standards are most useful to them.

78 (continued)

This is the "Description and Purpose" section of a maintenance standard on Joint and Crack Filling:

MAINTENANCE STANDARD

JOINT AND CRACK FILLING

April 17, 1972 **Activity No.** 101

DESCRIPTION AND PURPOSE: Cleaning and filling with liquid sealant, asphalt surface cracks which are greater than $\frac{1}{4}$-inch wide.

How should a foreman use this part of a maintenance standard?

A.	He should use it as a guide for when to do the work.	Go to Frame 79.
B.	He can use it for work reporting purposes.	Go to Frame 80.
C.	He should use it as a guide for spotting needed maintenance.	Go to Frame 81.

79

This is the most important way a foreman uses the "Description and Purpose" section. He has to know the conditions under which work should -- and should not be done.

79 (continued)

Suppose a foreman is scheduled to fill cracks and joints along a two-mile stretch of roadway. He doesn't go out and fill every crack in sight. Based on the standard, he decides which cracks to fill -- only those $\frac{1}{4}$-inch or more wide.

The other two answers in Frame 78 are also correct. A foreman should use the activity description of a standard if there is any confusion about which activity to report. He should also use it as a guide to determine whether or not maintenance is needed.

How about the "Crew/Equipment" and "Materials" sections of a maintenance standard? What can a foreman do with these sections?

A.	They aren't too useful to a foreman.	Go to Frame 82.
B.	They indicate to him what equipment and materials to take to the job site.	Go to Frame 83.
C.	They help him decide on an alternate activity if he can't do the scheduled work.	Go to Frame 84.

80

Yes, he can use the "Description and Purpose" section of a maintenance standard to make sure his work reports are accurate. For example, it's possible to confuse two activities that both involve the use of premix material. A quick comparison of the work done with the descriptions of the activities should settle all doubts about which activity to report.

So foremen can use standards for work reporting purposes.

80 (continued)

But the "Description and Purpose" section has a more important use for foremen.

Choose another answer from Frame 78.

81

Yes, a foreman can easily use this section for spotting needed maintenance. Suppose a foreman is filling cracks on a fairly long stretch of road when he notices some edge ruts along a shoulder. He checks the standard to see if the ruts are bad enough to report to the supervisor for scheduling.

This is a good answer. But another answer in Frame 78 involves a more important use.

Go to Frame 78.

82

This is a possibility. If a foreman always is assigned equipment for each job and if he makes no decisions on alternate work, then these sections of a maintenance standard may not be too useful to him.

Go to Frame 85.

83

Maybe. Sometimes a foreman is simply assigned an activity. In that case he has to know how many men and what equipment to take with him -- what men and equipment represent the best combination of resources.

If unusual conditions keep him from doing the scheduled work and if he can't reach the boss, he may also have to decide on alternate work based on the resources he has on hand.

In these instances, he uses the "Crew/Equipment" and "Materials" sections of the maintenance standard.

Go to Frame 85.

84

This could happen. If a foreman can't do the scheduled work, he tries to find alternate work that matches as closely as possible, the resources he has on hand.

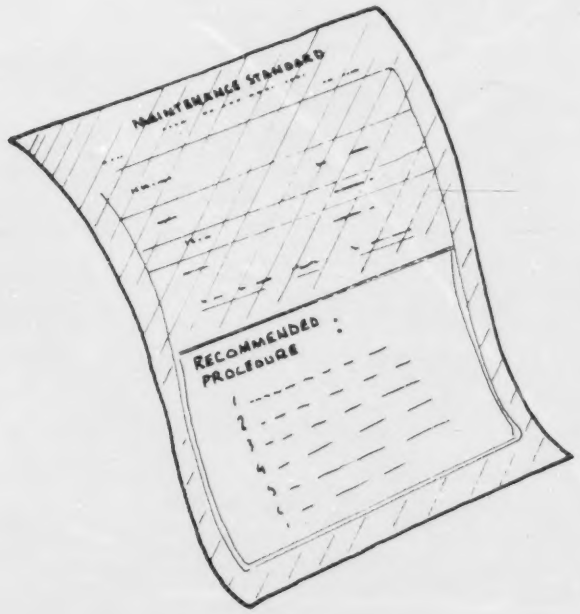
A foreman might be told "Go patch potholes on Siebert Road." In this case, the foreman uses the standard to determine the resources for the job.

These two instances may not be common to all maintenance departments. But even if they happen only a few times a year, the "Crew/Equipment" and "Materials" sections of the maintenance standards are useful to foremen.

Go to Frame 85.

85

The "Recommended Procedure" section of a maintenance standard is the one most widely used by foremen. This probably is obvious.



This section outlines the step-by-step method of doing the work. Many of the smaller details are not covered by the recommended procedure, but there is no doubt that the work should be done the recommended way. Any changes to the recommended work procedure should be first checked out by the boss.

What can be said about the recommended work procedures?

A.	They are simply suggestions to help foremen decide how to do the work.	Go to Frame 86.
B.	They should be followed whenever possible.	Go to Frame 87.
C.	They represent the best way of doing the work and should be followed.	Go to Frame 88.

86

Wrong. The recommended procedures are more than suggestions. In effect, they say, "This is the way work should be done."

Read Frame 85 again and choose another answer.

87

This statement is not strong enough. Recommended procedures should be followed, yes. But there's a better answer in Frame 85.

88

This is the best answer. The recommended procedures represent the best way of doing the work and should be followed.

The following is the "Accomplishment" section of a maintenance standard for Premix Patching:

ACCOMPLISHMENT	
Work Unit:	Ton of premix
Daily Production:	2-4 tons
Average Productivity:	5.0 man-hours/ton

88 (continued)

What does this section mean to a foreman?

A.	He uses it for work reporting purposes.	Go to Frame 89.
B.	These figures are what the boss expects -- daily.	Go to Frame 90.
C.	This is what the boss expects on the average.	Go to Frame 91.

89

You are partly correct. If a foreman is unsure of the work unit for an activity, he checks this part of the standard. He doesn't want to report "cubic yard of premix" when the work unit for premix patching is "ton."

A better answer is in Frame 88.

90

No. The figures for daily production and average productivity are not that hard and fast. You can't expect a foreman to hit these figures on the head for every single premix patching job. Too many things can go wrong.

Go to Frame 91.

91

Right. These are the results the boss expects on the average. The productivity figure of 5.0 man-hours/ton is a goal -- something to reach for. Average productivity after several premix patching jobs should be close to 5.0 man-hours/ton.

Go to Frame 92.

92

So, these are some of the ways in which foremen and crew leaders should be using standards. But foremen must know the standards before they can use them.

There are several ways to communicate the purpose and uses of maintenance standards. Some ways, of course, are more effective than others.

92 (continued)

Which of the following ways of communicating probably is the most effective?

A.	A notice on the bulletin board.	Go to Frame 93.
B.	A "How to Use Standards" class or discussion group.	Go to Frame 94.
C.	An announcement about standards handed out to each foreman.	Go to Frame 95.

93

You are saying that you expect foremen to understand and use maintenance standards after they have read a notice on the bulletin board. It might happen this way, but it's highly unlikely. A piece of paper tacked on a board is a very impersonal way of communicating. Voice contact, explanations and a willingness to answer questions make the communication more personal.

Pick another answer in Frame 92.

94

Right. A meeting or discussion group on the topic "How to Use Standards" is the best of the three choices -- it is the most personal. A notice on a garage bulletin board probably is the weakest way to communicate. A notice handed out to each person is a little better -- but not much.

94 (continued)

So, an oral communication of standards is better than a written one.

But just telling someone about standards may not be good enough.

Which of the following is the best example of communicating standards to foremen?

A.	"Hey, Joe! Have you heard about the new standards? The head office wants us to start using them."	Go to Frame 96.
B.	"Here are copies of the new maintenance standards. These standards are supposed to help you do your work better. Contact me if you have any questions."	Go to Frame 97.
C.	"Here are copies of the new maintenance standards. Their purpose is to .... Here are some of the ways they can be used...."	Go to Frame 98.

95

Look at it this way: Suppose you knew absolutely nothing about standards -- you had never used them. And then someone hands you a piece of paper that reads, "From now on everyone will use maintenance standards." This way of communicating standards is both confusing and irritating.

Go back to Frame 92.

96

This is the best one? Not really. Joe doesn't know any more about standards than he did before except that the head office is telling him to use them. And he probably has several questions to ask:

What are standards for?
How do I use them?
What do they do?

A better choice is in Frame 94.

97

This is not the best choice. It has a negative tone. "These standards are supposed to help you..." sounds as if the speaker doesn't really believe they will help. And, "...do your work better" sounds as if the speaker thinks the work is done poorly now.

There is a better answer in Frame 94.

98

This is the best answer. The speaker is explaining both the purposes and uses of maintenance standards. His tone indicates a willingness to answer questions and to help each foreman.

98 (continued)

Suppose the supervisor, Ed, is the speaker at this meeting. After much discussion and answering questions, Ed is sure that all of his foremen know why the standards should be used and how to use them. But after looking at the following week's work reports, Ed notices that production is falling off, productivity is low for some crews and he is sure that some of the work activities have been reported wrong.

How could Ed have prevented this situation?

A. By visiting the work sites to check on how the standards were being used. Go to Frame 99.

B. By calling several more meetings to discuss the standards. Go to Frame 100.

C. It takes time to adjust to a new way of doing things. Ed probably could not have prevented the situation. Go to Frame 101.

99

This is the answer we're looking for. Explaining standards and their uses in a meeting is one thing. Actually helping put those standards to practical use is another. Ed should have followed up his meeting by making work-site visits to check on how the standards were being used and to lend a hand if needed. The chances are that the foremen would have had fewer problems.

99 (continued)

Work-site visits, fairly regular meetings and face-to-face discussions should be used to spread the word about maintenance standards. You probably can think of other good methods. But the purpose of all these methods is the same:

+ To provide an understanding of the purposes and the uses of maintenance standards, and

+ To encourage the actual, practical use of those standards.

Go to Frame 102 for a short review.

100

Ed should have called more meetings? Maybe. But the foremen had no trouble understanding standards at the meeting. The trouble came when the standards were actually put into practice.

Ed could have done something before the trouble started.

Try again -- Frame 98.

101

It takes time to adjust to a new way of doing things. True.

Ed probably could not have prevented the situation. Maybe not. But there is something he should have tried first.

Go back to Frame 98.

Here is a summary of some of the important points in this part of "Standards for Maintenance Work."

+ Standards are goals to be reached, objectives for doing work and guidelines to follow.

+ Each part of a maintenance standard can be used to schedule, direct, perform or control work.

+ Quality standards must be followed. Performance standards should be followed.

+ Performance standards can be bent, but you should expect the results of your bending to be better than the results you would expect by using the standard.

+ When in doubt, use performance standards -- especially if there is reason to think that results of bending a standard will not surpass standard accomplishment.

+ There are many options and conditions which must be taken into account when using and interpreting standards.

+ The purpose and use of maintenance standards must be communicated to foremen and crew leaders -- by open discussions and job-site follow-up.

And that's about it! Maintenance standards are a most valuable management tool -- and like any other tool, it is meant to be used.